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EXAMINER	
PARK, EDWARD	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/813,060	LACHANCE ET AL.	
	Examiner	Art Unit	
	EDWARD PARK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/22/08 has been entered.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. **Claims 1-17** are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing (Reference the May 15, 2008 memorandum issued by Deputy Commissioner for Patent Examining Policy, John J. Love, titled "Clarification of 'Processes' under 35 U.S.C. 101" – publicly available at USPTO.GOV, "memorandum to examining corp"). The instant claims neither transform underlying subject matter nor positively

tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. In order for a process to be "tied" to another statutory category, the structure of another statutory category should be positively recited in a step or steps significant to the basic inventive concept, and NOT just in association with statements of intended use or purpose, insignificant pre or post solution activity, or implicitly.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1, 11, 12, 13, 14, 15, 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Abt et al (US 2003/0084409 A1) in view of Jouandet (US 5,038,285).

Regarding **claims 1, 11, 12**, Abt teaches a method for producing a three-dimensional model of a semiconductor chip from coarsely aligned mosaic images of respective layers of the semiconductor chip (figure 1), the method comprising: applying a line detection algorithm to each of the mosaic images corresponding to metal lines of the mosaic image (Abt: figure 1, numeral 12, 13, paragraph [0042]; entire surface of the integrated circuit is scanned and stitched together electronically to form a single electronic mosaic image of the entire layer representing the layer of the IC layout); and processing to define vias, lines and branch lines of the

semiconductor chip, interconnected to define the three-dimensional model (Abt: figure 1, numeral 17, paragraph [0048]). Abt does not teach producing a respective set of line segments, each line segment including a pair of endpoints identified by corresponding x and y coordinates with respect to a frame defined by the mosaic image; establishing at least two virtual reference points using endpoints from each of the mosaic images that are vertically aligned to within an uncertainty of the coarse alignment of the mosaic images; using the virtual reference points to adjust x and y coordinates of each of the mosaic images to align the mosaic images within a three dimensional coordinate space; processing the respective line segments of each mosaic image within the three dimensional coordinate space; identifying sets of endpoints that are coincident in a common x-y plane within the uncertainty of the coarse alignment of the mosaic images; selecting, from among the identified sets of coincident endpoints, at least two sets with a high coincidence in the common x-y plane; selecting a respective virtual reference point for each one of the selected sets of coincident endpoints; and identifying a mosaic image having end points associated with a highest percentage of the virtual reference points, and aligning each mosaic image to the identified mosaic image by adjusting x and y coordinates of each of the other mosaic images.

Jouandet, in the same field of endeavor, teaches producing a respective set of line segments, each line segment including a pair of endpoints identified by corresponding x and y coordinates with respect to a frame defined by the mosaic image (see figure 1, numeral 20, figure 6, figure 7, col. 4, lines 57-68, col. 5, lines 1-18); establishing at least two virtual reference points using endpoints from each of the mosaic images that are vertically aligned to within an uncertainty of the coarse alignment of the mosaic images (see figure 1, numeral 22, figure 6,

figure 7, col. 4, lines 57-68, col. 5, lines 1-18); using the virtual reference points to adjust x and y coordinates of each of the mosaic images to align the mosaic images within a three dimensional coordinate space (see figure 2, numeral 26, col. 6, lines 56-68); processing the respective line segments of each mosaic image within the three dimensional coordinate space (see figure 3, col. 7, lines 38-64); identifying sets of endpoints that are coincident in a common x-y plane within the uncertainty of the coarse alignment of the mosaic images (see figure 2, numeral 32, col. 7, lines 1-18); selecting, from among the identified sets of coincident endpoints, at least two sets with a high coincidence in the common x-y plane (see figure 2, numeral 32, col. 7, lines 1-18); selecting a respective virtual reference point for each one of the selected sets of coincident endpoints (see figure 2, numeral 32, col. 7, lines 1-18); and identifying a mosaic image having end points associated with a highest percentage of the virtual reference points (see figure 2, numeral 32, col. 7, lines 1-18), and aligning each mosaic image to the identified mosaic image by adjusting x and y coordinates of each of the other mosaic images (see figure 3, col. 7, lines 38-64).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Abt reference to identify line segments, establish virtual reference marks, adjust coordinates, process the end points, identify end points with high coincidence, and align each mosaic image as suggested by Jouandet, to "produc[e] two-dimensional maps of three-dimensional surfaces" (Jouandet: col. 1, lines 8-9) that "reduc[es] distortion between straight lines representations" (Jouandet: col. 3, lines 13-16).

Regarding **claim 13**, Abt teaches wherein processing the end points further comprises using predefined rules regarding configuration of the line segments to define lines and branch lines of the semiconductor chip (Abt: paragraph [0043]).

Regarding **claims 14, 15, 17**, Abt with Jouandet combination discloses all elements as mentioned above in claim 1. Abt with Jouandet combination as mentioned above does not teach displaying the 3-dimensional model to an operator, as a set of lines of predefined thickness.

Jouandet further teaches displaying the 3-dimesional model to an operator, as a set of lines of predefined thickness (Jouandet: figure 4, numeral 76), permitting the user to view any one of the mosaic images alone, the mosaic images with the 3-D model overlayed, and the 3-D model alone (Jouandet: figure 4, numeral 76); and permitting the operator to select a geometric area and displaying a part of the 3-D model in the geometric area (Jouandet: figure 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Abt with Jouandet combination to display a 3-dimensional model to an operator as suggested by Jouandet, to allow the user to visualize the object; allow the user to alter any parameters; or observe any defects that may have not been detected and corrected.

6. **Claims 2, 3, 4, 5, 6, 9, and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abt et al (US 2003/0084409 A1) with Jouandet (US 5,038,285) as applied to claim 1 above with Companion et al (US 6,330,354 B1), and further in view of Maruyama (US 5,272,763).

Regarding **claims 2, 3, 4, 5, 6, 9, and 10** Abt with Jouandet combination discloses all elements as mentioned above in claim 1. Abt with Jouandet combination does not teach:

applying an edge detector to obtain an edge bitmap defining edge objects;

selecting pixel regions of edge objects that are likely to constitute segments of metal lines, given predetermined parameters of the semiconductor chip;

applying a line tracing algorithm to each edge object to identify and store coordinates of corresponding line segments;

storing line segment coordinates in a hierarchical format with branch line segments nested with respect to previously identified line segments;

applying an algorithm that computes a difference between pixel values of neighboring pixels on opposite sides of a subject pixel to determine that the subject pixel is an edge transition pixel if the difference is above a predefined threshold;

applying an algorithm derived from at least one of Sobel, Prewitt, Roberts, and Hough transforms;

applying a line thinning procedure to pixels of the mosaic image bounded by the pixel regions of selected edge objects to produce a thinned line;

defining the line segments by coordinate positions of the pixels at the ends of each thinned line, and storing the end point coordinates in a database;

computing for each line segment a measure of uncertainty that the line segment constitutes a part of a metal line, using properties of the edge object, and properties of the thinned line given the predetermined parameters of the semiconductor chip; and

requesting an operator to examine the line segments with uncertainty measures above a predefined threshold.

Companion teaches:

applying an edge detector to obtain an edge bitmap defining edge objects (Companion: figure 2b, numeral 120);

selecting pixel regions of edge objects that are likely to constitute segments of metal lines, given predetermined parameters of the semiconductor chip (Companion: figure 2b, numeral 120);

applying an algorithm that computes a difference between pixel values of neighboring pixels on opposite sides of a subject pixel to determine that the subject pixel is an edge transition pixel if the difference is above a predefined threshold (Companion col. 5, lines 1-21);

applying an algorithm derived from at least one of Sobel, Prewitt, Roberts, and Hough transforms (Companion: col. 5, lines 1-21); and

computing for each line segment a measure of uncertainty that the line segment constitutes a part of a metal line, using properties of the edge object, and properties of the thinned line given the predetermined parameters of the semiconductor chip (Companion: figure 2b, numeral 124, 126).

requesting an operator to examine the line segments with uncertainty measures above a predefined threshold (Companion: figure 2b, numeral 140).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Abt with Jouandet combination to apply an edge detector, select pixel regions, apply a Hough transform as suggested by Companion, to rule out "false positives [that] would most likely occur [but are difficult] to handle [within many] layers, [of] repetitive pattern sequences" (Companion: col. 1, lines 55-65).

Maruyama teaches:

applying a line tracing algorithm to each edge object to identify and store coordinates of corresponding line segments (Maruyama: col. 9, lines 59-68; col. 10, lines 1-23);

storing line segment coordinates in a hierarchical format with branch line segments nested with respect to previously identified line segments (Maruyama: col. 3, lines 1-28);

applying a line thinning procedure to pixels of the mosaic image bounded by the pixel regions of selected edge objects to produce a thinned line (Maruyama: col. 9, lines 59-68; col. 10, lines 1-23); and

defining the line segments by coordinate positions of the pixels at the ends of each thinned line, and storing the end point coordinates in a database (Maruyama: col. 9, lines 59-68; col. 10, lines 1-23).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Abt, Jouandet, with Companion combination as mentioned above to apply a line tracing algorithm, storing in a hierarchical format, line thinning procedure, and coordinate positions of the pixels as suggested by Maruyama, to "accurately perform the wiring pattern inspection without requiring complex positioning" which is essential due to the numerous lines that are present.

7. **Claims 7, 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abt et al (US 2003/0084409 A1), Jouandet (US 5,038,285), Companion et al (US 6,330,354 B1), with Maruyama (US 5,272,763) as applied to claim 6 above, and further in view of Martin et al (Robotics, "Image Processing Techniques for Machine Vision").

Regarding **claims 7 and 8**, Abt, Jouandet, Companion, with Maruyama combination discloses all elements as mentioned above in claim 6. Abt, Jouandet, Companion, with

Maruyama combination does not teach iteratively setting pixel values of boundary pixels to a background pixel value, until the pixels that remain are bounded by background pixel values on two sides and applying an algorithm derived from at least one of a Zhang Suen skeletonizing algorithm, and a Stentiford skeletonizing algorithm.

Martin teaches iteratively setting pixel values of boundary pixels to a background pixel value, until the pixels that remain are bounded by background pixel values on two sides (Martin: pg. 6, right column) and applying an algorithm derived from at least one of a Zhang Suen skeletonizing algorithm, and a Stentiford skeletonizing algorithm (Martin: pg. 6-8).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Abt, Jouandet, Companion, with Maruyama combination to utilize a Stentiford skeletonizing algorithm as suggested by Martin, to "erode the outer layers of pixel until no more layers can be removed" which proves to be a "popular because of their reliability and effectiveness" (Martin: pg. 7, left column).

8. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abt et al (US 2003/0084409 A1) with Jouandet (US 5,038,285) as applied to claim 14 above, and further in view of Phan et al (US 6,808,591 B1).

Regarding **claim 16**, Abt with Jouandet discloses all elements as mentioned above in claim 14. Abt with Jouandet combination does not teach permitting the operator to select any line, to create an annotation for a selected line; and to edit the connectivity of the line segments, and placements of vias.

Phan teaches permitting the operator to select any line, to create an annotation for a selected line; and to edit the connectivity of the line segments, and placements (Phan: col. 4, lines 15-35).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Abt with Jouandet combination to allow the operator to select and edit line segments and placements as suggested by Phan, to further enhance the operator's ability to examine and rectify any defective line segments by graphical analysis.

Response to Arguments

9. Applicant's arguments filed on 6/24/08, in regards to **claim 1**, have been fully considered but they are not persuasive. Applicant argues that the Jouandet reference is not reasonably pertinent to the particular problem with which inventor was concerned (see pg. 8, first paragraph). This argument is not considered persuasive since the Jouandet reference is utilized to resolve the issue of aligning multiple images with each other utilizing virtual points to create a representation that is reduced in error (see Jouandet: col. 2, lines 46-68; col. 3, lines 1-19). Therefore, the Jouandet reference is pertinent to the particular problem with which inventor was concerned and is also considered in the same field of endeavor of creating image representations through adjustment and combination of various images.

Applicant argues that Jouandet does not attempt to improve alignment between images, and thus is not reasonably pertinent to the particular problem with which the inventors were concerned (see pg. 8, second paragraph). This argument is not considered persuasive since it is clearly shown by Jouandet in col. 1, lines 8-9, col. 3, lines 13-16, that the Jouandet reference is

utilized to "produc[e] two-dimensional maps of three-dimensional surfaces" that "reduc[es] distortion between straight lines representations by repositioning the straight line representations in accordance with the findings". Furthermore, in response to applicant's argument that the applicant's invention attempts to improve alignment between mosaic images of respective layers of an integrated circuit, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Furthermore, applicant argues that Jouandet does not attempt to address the issue of aligning images (see pg. 8, third paragraph). This argument is not considered persuasive since the surface lines of Jouandet represent an image in regards to alignment. Also, the Jouandet reference is to bring in the concept of identify line segments, establish virtual reference marks, adjust coordinates, process the end points, identify end points with high coincidence, and align each mosaic image to incorporate with the Abt reference, no more or less. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, claim 1 aligns images similar to the Jouandet reference by detecting line segments that represent images for alignment purposes. Therefore, applicant's argument that Jouandet does not address this issue is not persuasive for the reasons as stated above.

Lastly, applicant argues that Jounadet is non-analogous prior art (see pg. 8, fourth paragraph). This argument is not considered persuasive since it has been argued why Jounadet is prior art and is proper in utilizing the reference in the rejection of claim 1 as stated above. In response to applicant's argument that Jounadet reference is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, it is clear that the Jounadet reference resolves a particular problem in col. 1, lines 8-9, col. 3, lines 13-16, where the Jouandet reference is utilized to "produc[e] two-dimensional maps of three-dimensional surfaces" that "reduc[es] distortion between straight lines representations by repositioning the straight line representations in accordance with the findings".

Applicant argues that Jouandet does not teach virtual reference points are established using endpoints from each of the mosaic images that are vertically aligned to within an uncertainty of the coarse alignment of the mosaic images (see pg. 9, first paragraph). This argument is not considered persuasive since Jouandet teaches this limitation in figure 1, numeral 22, figure 6, figure 7, col. 4, lines 57-68, col. 5, lines 1-18, col. 6, lines 56-68, where the outline of the surface line 100 is digitized and surface points are constructed to produce a crestline, and all surface lines 152 are aligned along line 154 with the base reference point of each surface line 152 being coincident therewith; which also takes into account distances between each surface line to adjust for the appropriate distance along the z axis direction 156. Applicant argues that at least two virtual reference points are defined for each mosaic image (see pg. 9, first paragraph).

This argument is not considered persuasive since Jouandet teaches the limitation within figure 1, numeral 20, figure 6, figure 7, col. 4, lines 57-68, col. 5, lines 1-18, where surface points 110 are added to the surface line 100, which is equivalent to the claimed limitation.

Applicant argues that Jouandet does not teach virtual reference points are used to define the mosaic images within a three dimensional coordinate space (see pg. 9, last paragraph). This argument is not considered persuasive since the claim does not cite the specific claim limitation as admitted by the applicant's amendment of claim 1 as seen in pg. 9, last paragraph. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., virtual reference points are used to define the mosaic images within a three dimensional coordinate space) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant argues that Jouandet does not teach virtual reference points are used to align the mosaic images within a three dimensional coordinate space (see pg. 9, last paragraph). This argument is not considered persuasive since Jouandet teaches this limitation as previously argued above and cited within figure 1, numeral 22, figure 6, figure 7, col. 4, lines 57-68, col. 5, lines 1-18, col. 6, lines 56-68.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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